



LAKE CLASSIFICATION SHORT REPORT ON MASON LAKE, ADAMS COUNTY, WI

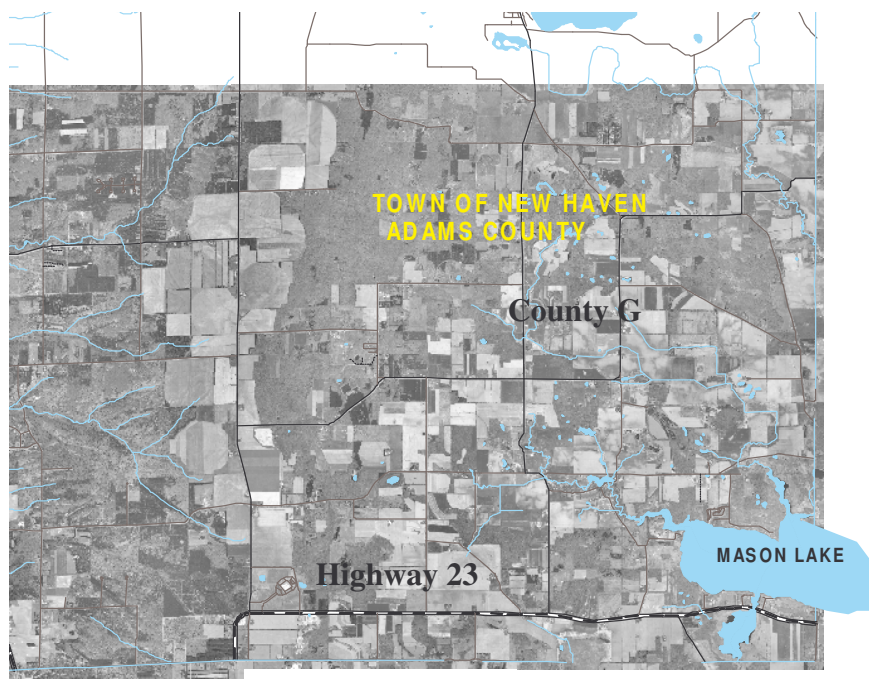
**Presented by Reesa Evans, Lake Specialist
Adams County Land & Water Conservation Department
P.O. Box 287, Friendship, WI 53934**

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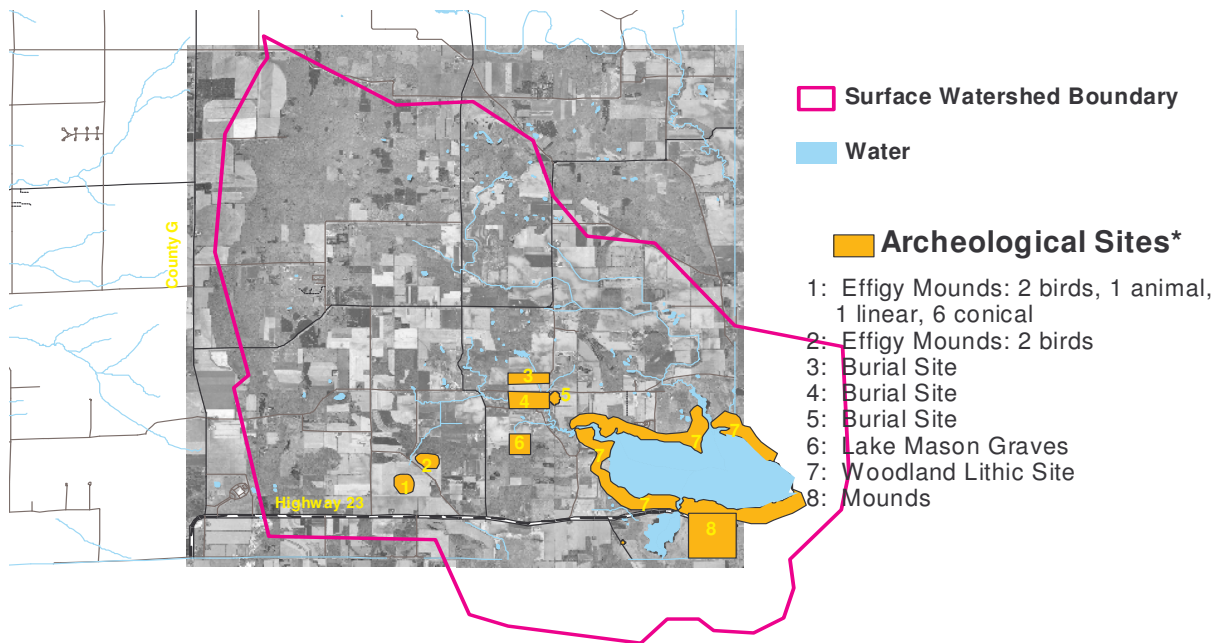
Information about Mason Lake: Mason Lake is located in the Town of New Haven, Adams County, WI, in the Town of Douglas, Marquette County, and in the Town of Lewiston, Columbia County, in the south central part of Wisconsin. The largest part of the impoundment lies in Adams County. It is reached off of Highway 23 as it goes east. The impoundment (man-made lake) has 855 surface acres, maximum depth of 9', with a surface watershed covering 28 square miles. The Town of Douglas owns the dam forming Mason Lake. Attached to Mason Lake by a channel is Amey Pond. Amey Pond is operated as a waterfowl refuge by the Wisconsin Department of Natural Resources and Duck Unlimited jointly.

In 2002, Mason Lake was placed on the federal impaired waterways list (commonly called the "303(d)" list). The reasons for this placement included highly-elevated phosphorus level, eutrophication, pH problems, NPS contamination and degraded habitat. Mason Lake is one of the WDNR's "trend lakes", meaning that the WDNR regularly examines the lake for water quality and related issues.

Mason Lake, Town of New Haven



Mason Lake Archeological Sites



RE:4/05; revised 7/06

*information from Wisconsin Historical Society



Conical mound

There are many Native American archeological sites in Adams County, with several located right around Mason Lake. To protect Native American heritage, both federal and state laws prohibit further disturbance of these sites without permission of the federal government and input from the local tribes.

Land Use

The surface watershed for Mason Lake is large. The bulk of the watershed (57.8%) is in agricultural use; second largest land use is woodlands (31.7%). Residential use tends to be scattered, except for around the lake itself. Studies have shown that a lake is the product of its watersheds, with land use around a lake having a great impact on the water quality of that lake, especially in the amount and content of stormwater runoff from the surface. Stormwater runoff volume is affected by the amount of impervious surface, the soil type and the slope of the area. Natural landscapes tend to have low runoff rates.

Land use by acreage and percent of total is listed on the graph below:

Mason Lake	Acres	% Total
Agriculture--Non Irrigated	18,748.79	57.80%
Grassland/Pasture	356.81	1.10%
Residential	1946.24	6.00%
Water	1102.87	3.40%
Woodlands	10,282.64	31.70%
total	32,437.35	100.00%

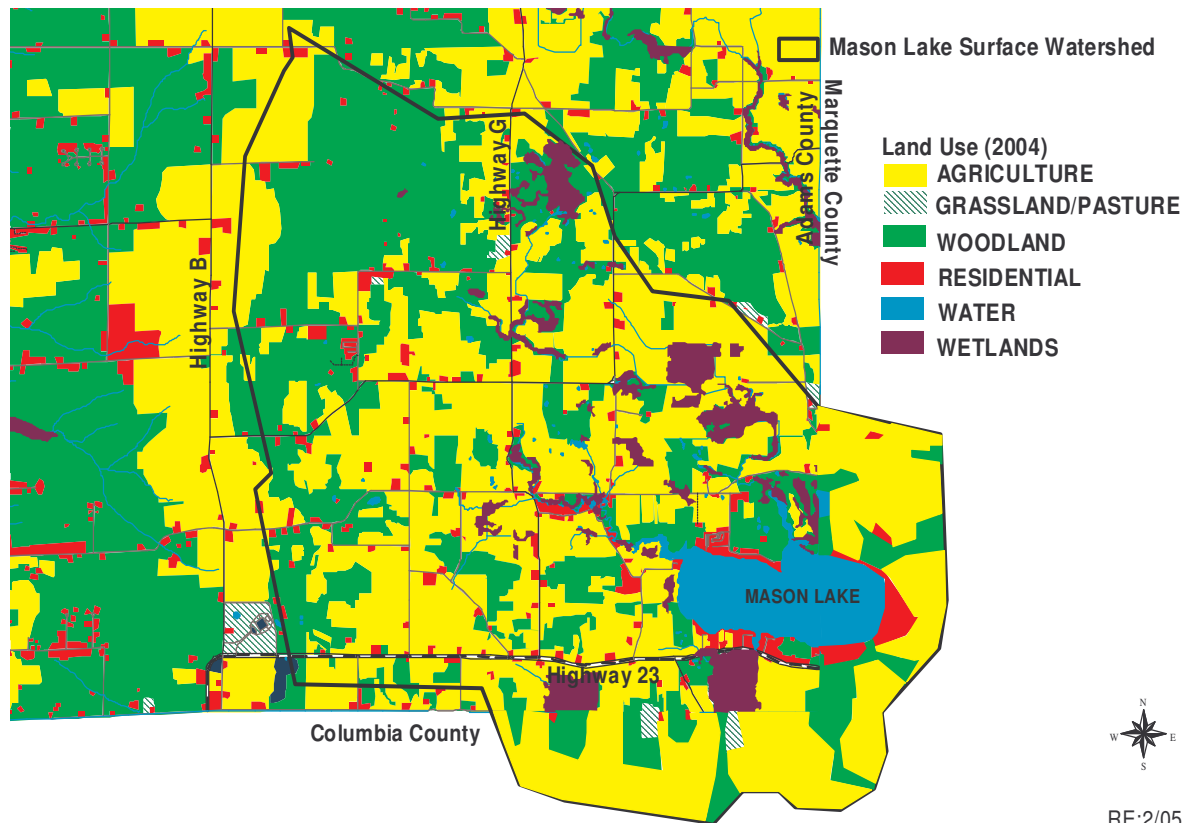
The largest land use in the surface watershed for Mason Lake is non-irrigated agriculture. Traditionally, agriculture may contribute significantly to the amount of nutrients in water.

Woodlands are the second largest land use category in Mason Lake's surface watershed, but contributes only about 5.3% of nutrients to Mason Lake waters. Since forest floors are often full of leaves, needles and other duff, runoff from forested lands is may be more filtered than that from agricultural or residential lands.

Residential land use is the third most common the land use in Mason Lake's surface watershed, especially around the lake itself, where residential land use is most concentrated. This land use category, in some instances, may also contribute a significant amount of nutrients to the water from stormwater runoff, manicured lawns, and impervious surfaces.

There are several wetlands (seen in purple on the land use map) in the watershed. Indeed, part of Mason Lake is a flooded wetland. Wetlands play an important role in water quality by trapping many pollutants in runoff waters and by serving as buffers to catch and control what would otherwise be uncontrolled water and pollutants. Wetlands also play an essential role in the aquatic food chain, thus affecting fishery, and also serve as spaces for wildlife habitat, wildlife reproduction & nesting, and wildlife food. It is essential to preserve these wetlands for the health of Mason Lake waters.

LAND USE IN MASON LAKE SURFACE WATERSHED



Like many lakes in Wisconsin, Mason Lake is a phosphorus-limited lake. This means of the pollutants which end up in the lake, the one in the shortest supply most affecting the overall quality of the lake water is phosphorus. Land use types play a major role in determining the amount of phosphorus being loaded into the lake.

MOST LIKELY PHOSPHORUS LOADING		
BY LAND USE	%	current
Non-Irrigated Agriculture	87.70%	9013.40
Grassland/Pasture	0.60%	44.00
Residential	3.60%	371.80
Woodlands	5.30%	550.00
Other Water	0.40%	44.00
Lake Surface	1.50%	151.80
Septics	0.90%	88.00
total in pounds/year	100.00%	10263.00

Some aspects of phosphorus loading can't be modified by human behavior—they are simply part of the natural landscape. However, phosphorus loading from agriculture, residential, recreational and septic use of the land can be decreased or increased by human activity. A mere 10% reduction in these three areas would result in 947.32 **fewer** pounds per year of phosphorus. Considering that one pound of phosphorus might produce as much as 500 pounds per year, 947.32 pounds of phosphorus could translate into as much as 473,660 pounds **fewer** of algae per year!

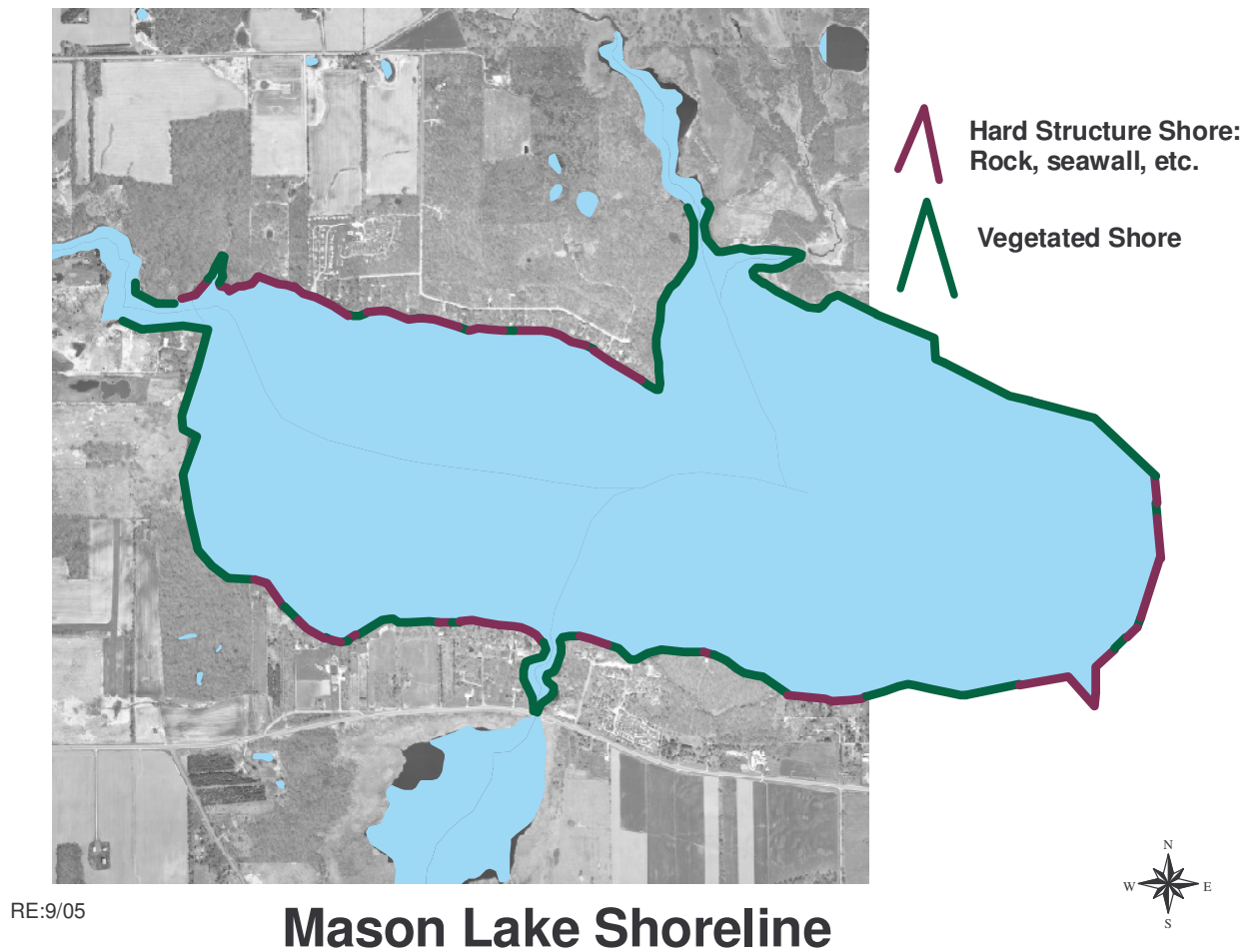
Land Use	current	-10%	-25%	-50%
Non-Irrigated Agriculture	9013.40	8112.06	6760.05	4506.70
Grassland/Pasture	44.00	44.00	44.00	44.00
Residential	371.80	334.62	278.85	185.90
Woodlands	550.00	550.00	550.00	550.00
Other Water	44.00	44.00	44.00	44.00
Lake Surface	151.80	151.80	151.80	151.80
Septics	88.00	79.20	66.00	44.00
total in pounds/year	10263.00	9315.68	7894.70	5526.40

Shorelands

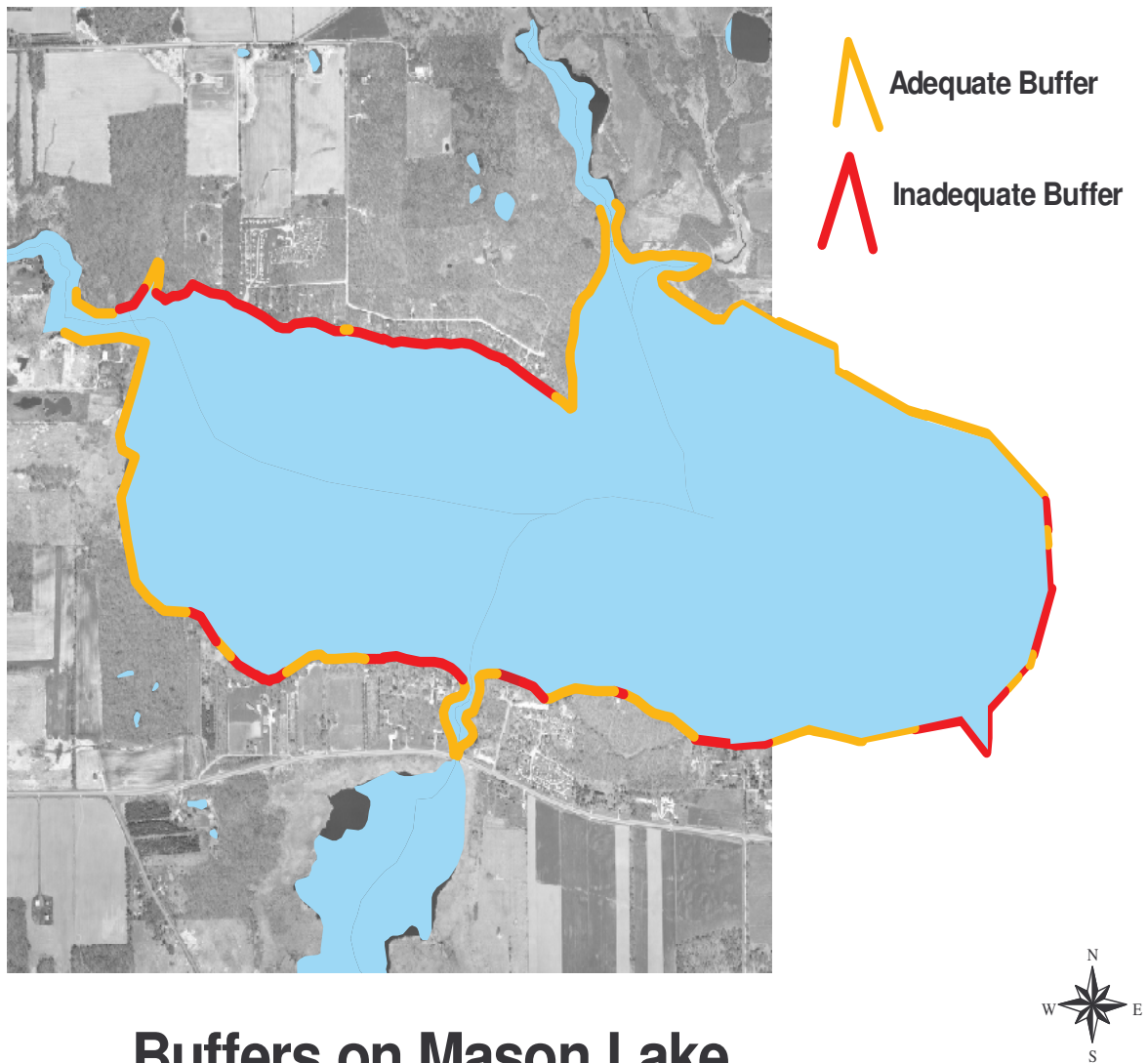
Mason Lake has a total shoreline of 7.53 miles (39,758.4 feet). The lakeshore tends to be heavily developed over most of the shoreline. Briggsville is located on the southeast part of the lake, with several businesses located along the shore.

Some people have claimed that Mason Lake is the oldest impoundment in Wisconsin. Records show that a dam was first built in 1852, so it is clear that the lake has been in use a long time. Many of the buildings are not set back much from the shore, since they were built before shoreline regulations were implemented. Runoff from impervious structure is likely to be aggravated at Mason Lake, due to the nature of the settlement around the lakeshore & the buildings near the shoreline.

52.4% of Mason Lake's shoreline is vegetated with native vegetation. The rest is a combination of traditional cultivated lawn, rock riprap, seawalls, and sand.



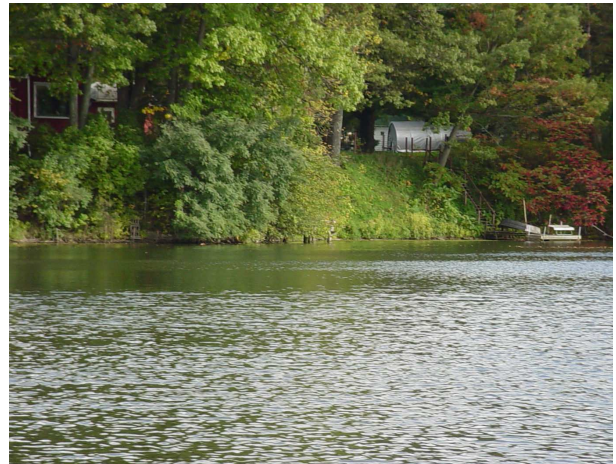
A 2004 shore survey showed that only about 1/2 of the shore had an “adequate buffer.” An “adequate buffer” is a native vegetation strip at least 35 feet landward from the shore. Most of the “inadequate” buffer areas were those with mowed lawns insufficient native vegetation at the shoreline to cover 35 feet landward from the water line, and/or seawalls or rock.



RE:9/05

Buffers on Mason Lake

Shoreland buffers are an important part of lake protection and restoration. These buffers are simply a wide border of native plants, grasses, shrubs and trees that filter and trap soil & similar sediments, fertilizer, grass clippings, stormwater runoff and other potential pollutants, keeping them out of the lake. A 1990 study by the Wisconsin Department of Natural Resources of Wisconsin shorelines revealed that a buffer of native vegetation traps 5 to 18 times more volume of potential pollutants than does a developed, traditional lawn or hard-armored shore. The filtering process and bank stabilization that buffers provide help improve a lake's water quality, including water clarity.



Example of Adequate Buffer



Example of Inadequate Buffer

Vegetated shoreland buffers help stabilize shoreline banks, thus reducing bank erosion. The plant roots give structure to the bank and also increase water infiltration and decrease runoff. A vegetated shore is especially important when shores are soft, as are many of the Mason Lake shores.

Water Quality Information

One of the measures Wisconsin uses to give a general estimate of a lake's water quality is the **trophic state index**. This index looks at a lake's water clarity, its amount of total phosphorus (the element most related to aquatic plant and algal growth), and its chlorophyll-a level (chlorophyll-a is a pigment used by algae for photosynthesis).

Depending on the trophic index score, lakes are then classified as **Oligotrophic** (good), **Mesotrophic** (fair), or **Eutrophic** (poor):

- **Good:** Oligotrophic lakes have clear, deep water with few algal blooms. Larger game fish are often found in such lakes.
- **Fair:** Mesotrophic lakes have more aquatic plant and algae production, with occasional algal blooms and a good fishery. The water is usually not as clear as that of oligotrophic lakes.
- **Poor:** Eutrophic lakes are very productive, with lots of aquatic plants and algae. Algal blooms are often frequent in these lakes. They may have a diverse fishery, but rough fish (such as carp) are also common. Water is often cloudy or murky. Small shallow lakes are more likely to be eutrophic.

Score	<u>TSI Level Description</u>
30-40	Oligotrophic: clear, deep water; possible oxygen depletion in lower depths; few aquatic plants or algal blooms; low in nutrients; large game fish usual fishery
40-50	Mesotrophic: moderately clear water; mixed fishery, esp. panfish; moderate aquatic plant growth and occasional algal blooms; may have low oxygen levels near bottom in summer
50-60	Mildly Eutrophic: decreased water clarity; anoxic near bottom; may have heavy algal bloom and plant growth; high in nutrients; shallow eutrophic lakes may have winterkill of fish; rough fish common
60-70	Eutrophic: dominated by blue-green algae; algae scums common; prolific aquatic plant growth; high nutrient levels; rough fish common; susceptible to oxygen depletion and winter fishkill
70-80	Hypereutrophic: heavy algal blooms through most of summer; dense aquatic plant growth; poor water clarity; high nutrient levels

Mason Lake's overall TSI is 65



Water clarity readings are usually taken by using a Secchi disk (shown at right). Average summer Secchi disk clarity in Mason Lake in 2004-2006 was 2.5 feet. Records since 1987 show that this water clarity reading is less than the average in the late 1980s. This is probably as a result of the problems noted in the 303(d) classification: highly-elevated phosphorus level, eutrophication, pH problems, NPS contamination and degraded habitat

This puts Mason Lake's water clarity in the "very poor" category. Water clarity can be reduced by turbidity (suspended materials such as algae and silt) and dissolved organic chemicals that color or cloud the water.

Increased phosphorus levels in a lake will feed algal blooms and also may cause excess plant growth. **The 2004-2006 summer average phosphorus concentration in Mason Lake was 73.25 micrograms/liter.** This is far above the recommended 30 micrograms/liter average for impoundments in Wisconsin to avoid frequent algal blooms. Phosphorus levels have been consistently high in Mason Lake, even going back to the 1930s, when the lake was described as "pea soup." This puts the lake in the "poor" category for total phosphorus.



The third measure used in trophic state classification is the amount of chlorophyll-a contained in the lake. The amount of chlorophyll-a found in a lake is an indication about the amount of algae in the lake. The 2004-2006 summer average chlorophyll-a concentration in Mason Lake was 31.91 micrograms/liter. This level of chlorophyll-a gives Mason Lake a "poor" ranking for chlorophyll-a. With such a reading, frequent algal blooms would be expected in Mason Lake.

In-Lake Habitat

Aquatic Plants

A diverse aquatic plant community plays a vital role in improving water quality, providing valuable habitat resources for fish and wildlife, resisting invasions of non-native species and checking excessive growth of the most tolerant species.

An updated aquatic plant survey was performed in 2005. The 5'-10' depth zone supported the most abundant aquatic plant growth, but the 0-1.5' and 1.5'-5' were close behind. There was high growth in all three depths zones found in Mason Lake.

The Mason Lake aquatic plant community is characterized by less than average quality and lower than average species diversity. *Ceratophyllum demersum* (coontail), *Chara* spp (muskgrass), *Myriophyllum sibiricum* (northern watermilfoil), and *Myriophyllum spicatum* (Eurasian watermilfoil, an invasive exotic) were the most common aquatic species.

Important to maintaining a quality, diverse aquatic plant community is an integrated aquatic plant management plan that controls the invasive plants in the lake. Both Eurasian watermilfoil and *Potamogeton crispus* (curly-leaf pondweed) have risen to nuisance levels in Mason Lake, but when comparing the results of the 2005 survey to the 2001 survey, both had declined in density and occurrence frequency. Diversity had also increased.

Unfortunately, there was also increased dense growth. Six aquatic species occurred at higher than average density in 2005.

More detailed information can be found in the aquatic plant report of the 2005 survey, available on request from the WDNR or Adams County Land & Water Conservation Department.



Curly-Leaf Pondweed

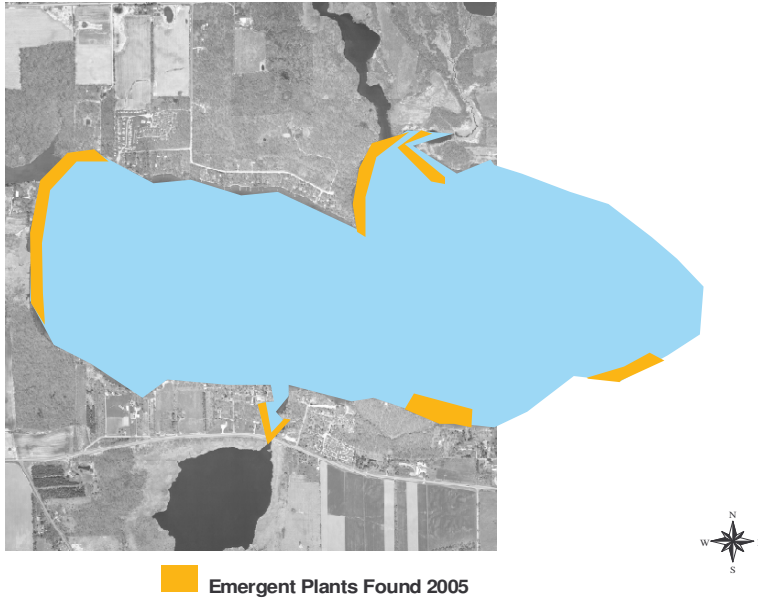


Purple Loosestrife

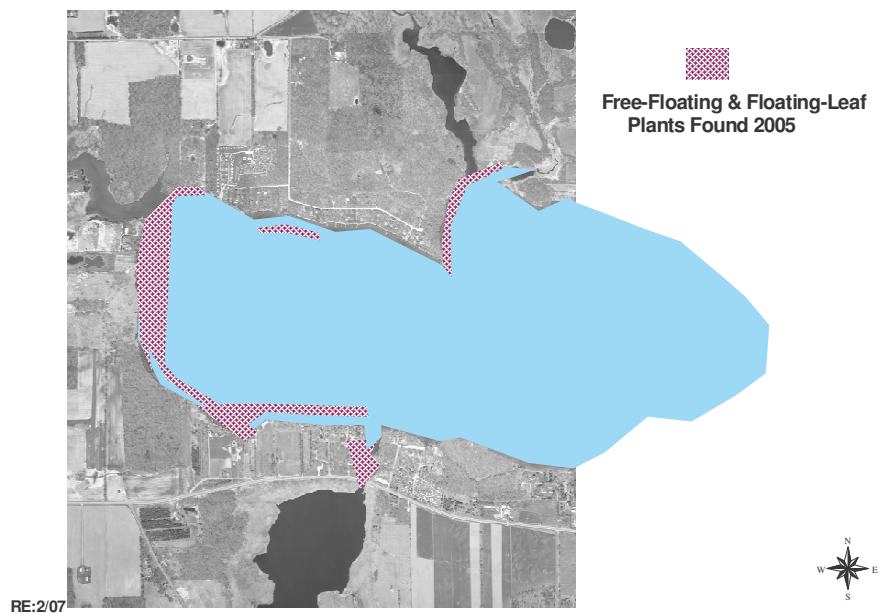


Eurasian Watermilfoil

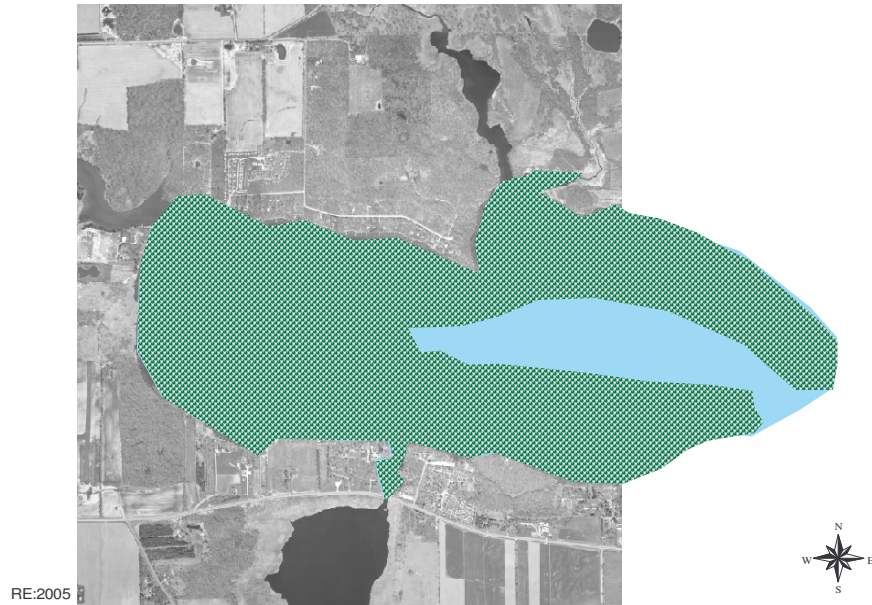
Emergent Plants in Mason Lake



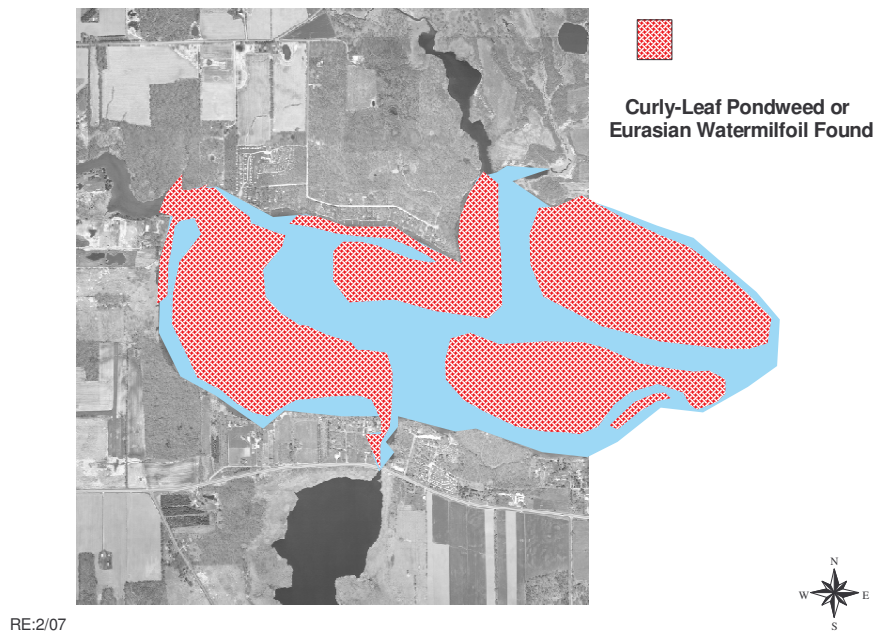
Free-Floating & Floating-Leaf Plants in Mason Lake



Submerged Aquatic Plants



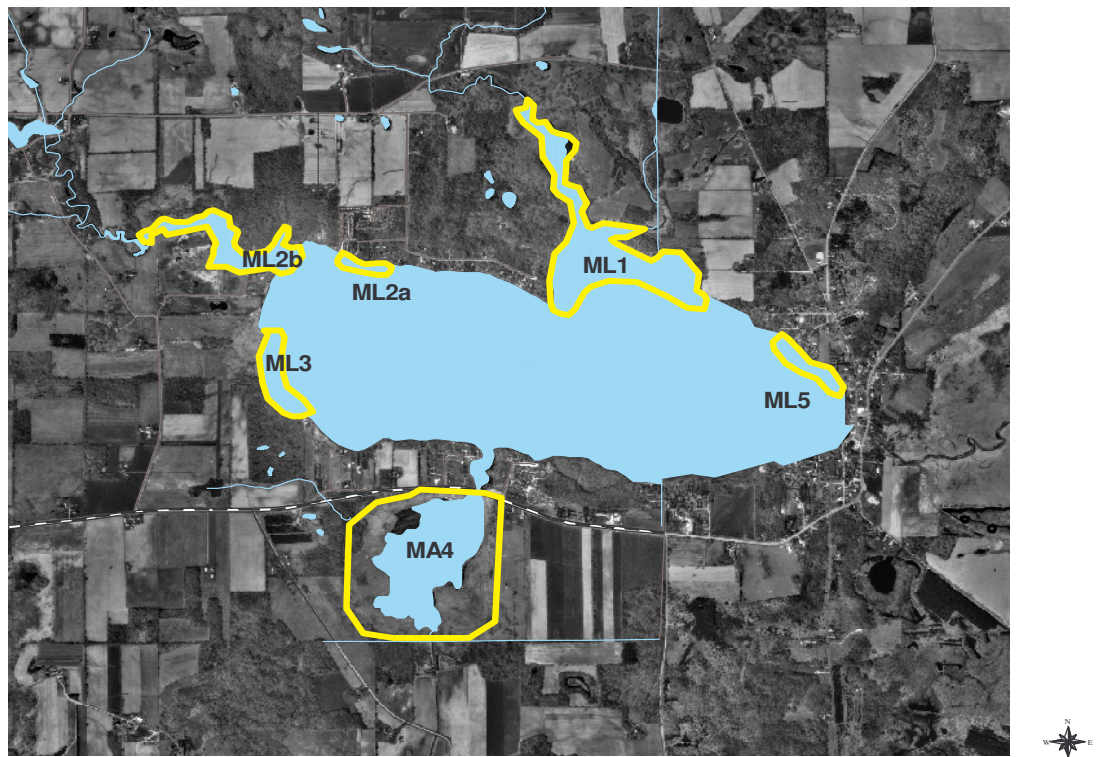
Exotics in Mason Lake 2005



Critical Habitat

Wisconsin Rule 107.05(3)(i)(I) defines a “critical habitat areas” as: “areas of aquatic vegetation identified by the department as offering critical or unique fish & wildlife habitat or offering water quality or erosion control benefits to the body of water. Thus, these sites are essential to support the wildlife and fish communities. They also provide mechanisms for protecting water quality within the lake, often containing high-quality plant beds. Finally, critical habitat areas often can provide the peace, serenity and beauty that draw many people to lakes in the first place.

Critical Habitats: Mason Lake



RE:6/07

Five areas on Mason Lake were determined to be appropriate for critical habitat designation. ML1 extends along approximately 4000 feet of shore in Burn's Cove and up into the stream, up to the ordinary high water mark. ML2a is approximately 600 feet of the northwest shoreline. ML2b is 800 feet of lakeshore at the Big Spring Inlet and up into the tributary. ML3 extends along 2000 feet of shoreline at the west end of the lake and is a wetland area. ML4 includes all of Amey's Pond & the area immediately around it. Finally, Area ML5 goes along 1000 feet of shoreline at the northeast end of the Mason Lake and protects a fish spawning area.

The Critical Habitat Report for Mason Lake has more specific information on these sites. Copies are available from the Wisconsin Department of Natural Resources.

Fishery/Wildlife/Endangered Resources

WDNR stocking records for Mason Lake date back to the 1950's, when northern pike, walleye, bluegills, black crappie, white crappie and largemouth bass were stocked. There were large restockings of the lake in 1971 and 1972 after a chemical kill of fish in 1970 to rid the lake of carp. Rough fish removal in the tons started in the 1930s. The most recent fish inventory revealed that bluegills were abundant; black crappie, largemouth bass and yellow perch were common; but northern pike and green sunfish were scarce. Pumpkinseeds have also been found in Mason Lake.

Muskrat are known to use Mason Lake shores for cover, reproduction and feeding. Seen during the field survey were various types of waterfowl and songbirds. Frogs and salamanders are known, using the lake shores for shelter/cover, nesting and feeding. Turtles and snakes also use this area for cover or shelter in this area, as well as nested and fed in this area. Upland wildlife feed and nest here as well.

The Mason Lake surface watershed is reported to contain several endangered resources. Special natural communities in this watershed include northern sedge meadow, spring & pond runs (hard) and spring pond. Threatened wildlife include *Fundulus diaphanous* (banded killifish), *Tyto alba* (barn owl), and *Notropis texanus* (weed shiner fish). Two plant species, *Gentianopsis virgata* (lesser fringed gentian) and *Deschampsia caepitosa* (tufted hairgrass) have also been reported. Wild rice beds used to be found in Mason Lake as well.



TUFTED HAIRGRASS

BARN OWL



WEED SHINER

Recommendations

Lake Management Plan

- When it is up to be revised, the Mason Lake District needs to make sure that the lake plan needs to include at least the following aspects concerning the management of the lake: integrated aquatic species management; control and/or management of invasive species; wildlife and fishery management; nutrient budgeting; shoreland protection; critical habitat protection; water quality protection.

Watershed Recommendations

- Since computer modeling results suggest that input of nutrients, especially phosphorus, are a factor that needs to be explored for Mason Lake, it is recommended that both the surface and ground watersheds be inventoried, documenting any of the following: runoff from any livestock operations that may be entering the surface water; soil erosion sites; agricultural producers not complying with nutrient management plans and/or irrigation water management plans.
- If such sites are documented, the Mason Lake District should encourage landowners & Adams County Land & Water Conservation Department to design and implement practices to address site issues.

Water Quality Recommendations

- All lake residents should practice best management on their lake properties, including keeping septic systems maintained in proper condition and pumped every three years, eliminating the use of lawn fertilizers, cleaning up pet wastes and not composting near the water.
- Reducing the amount of impervious surface around the lake and management of stormwater runoff will also help maintain water quality. Installation of rain gardens or similar storm runoff would help.
- Residents should become involved in the Citizen Lake Water Monitoring Program, which includes training for water quality monitoring, invasive species monitoring and Clean Boats, Clean Waters.
- Wide-scale restoration of natural shoreline around Mason Lake is very important. The decreasing water clarity and high chlorophyll-a levels show that the water quality of the lake is declining. Studies show that shores with native vegetation

are likely to contribute positively to water quality and that the aquatic plant community at those sites (native shores) tend be of high quality and diversity.

Aquatic Plant Recommendations

- All lake users should protect the aquatic plant community in Mason Lake by assisting in developing and implementing an integrated aquatic plant management plan that uses multiple methods of control. There is a long history of using chemicals only to deal with aquatic plant and exotic species control. It is essential that the Lake District start taking a multiple-pronged integrated approach to managing the aquatic plants.
- The Mason Lake District should maintain exotic species signs at the boat landings and contact DNR if the signs are missing or damaged.
- The Mason Lake District should monitor Eurasian Watermilfoil and Curly-Leaf Pondweed and take steps to maintain the most effective (and multiple) methods and modify them if necessary. Residents should hand-pull scattered plants.
- Lake residents should get involved in the county-sponsored Citizen Aquatic Invasive Species Monitoring Program. This will allow not only noting changes in the Eurasian Watermilfoil and Curly-Leaf Pondweed pattern, but also for other invasives. Noting the presence and density of invasives early is the best way to take preventive action to keep them from becoming a bigger problem.

Critical Habitat Recommendations

- Maintain current habitat for fish and wildlife.
- Leave fallen trees along shoreline & in water.
- Seasonal protection of spawning habitat. No disturbance of the littoral zone except for access/viewing corridor and/or WDNR-approved projects.
- Maintain the wildlife corridor.
- Maintain sedge meadow/deep marshes areas. Re-establish wild rice beds, if possible.
- Protection emergent vegetation.
- Seasonal control of exotics. Continued monitoring for exotics.
- No bank grading or grading of adjacent land. Use of bioengineering practices only in instances of bank protection.
- Any additional piers that are installed should be minimal in number and use only light-penetrating material.
- Maintain aquatic vegetation in undisturbed condition for wildlife habitat, fish use and water quality protection.
- Make critical habitat areas “no wake” areas to reduce disturbance to these areas.